

Information technology — Software process assessment —

Part 7: Guide for use in process improvement

ICS 35.080

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee IST/15, Software engineering, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the ISO/IEC TR title page, pages ii to iv, pages 1 to 28, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Amendments issued since publication

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TECHNICAL REPORT

ISO/IEC TR 15504-7

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Information technology — Software process assessment —

Part 7: Guide for use in process improvement

*Technologies de l'information — Évaluation des procédés du logiciel —
Partie 7: Guide pour l'utilisation dans l'amélioration de procédé*



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Descriptors: Data processing, information interchange, computers, computer software, estimation, process assessment, rules (instructions).

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

The main task of technical committees is to prepare International Standards, but in exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

- type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;
- type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;
- type 3, when a technical committee has collected data of a different kind from that which is normally published as an International Standard (“state of the art”, for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

ISO/IEC TR 15504-7, which is a Technical Report of type 2, was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software engineering*.

ISO/IEC TR 15504 consists of the following parts, under the general title *Information technology — Software process assessment*:

- *Part 1: Concepts and introductory guide*;
- *Part 2: A reference model for processes and process capability*;
- *Part 3: Performing an assessment*;
- *Part 4: Guide to performing assessments*;
- *Part 5: An assessment model and indicator guidance*;
- *Part 6: Guide to competency of assessors*;
- *Part 7: Guide for use in process improvement*;
- *Part 8: Guide for use in determining supplier process capability*;
- *Part 9: Vocabulary*.

Annex A to Annex C of this part of ISO/IEC TR 15504 are for information only.

Introduction

The needs and business goals of an organization are often centred around achieving enhanced customer satisfaction and greater competitiveness. For organizations with a dependence on software, these key management concerns become drivers that initiate software process improvement throughout the organization with goals of higher software quality, lower development and maintenance costs, shorter time to market, and increased predictability and controllability of software products and processes.

Software process improvement is best considered as a continuous process, where an organization moves continually around an improvement cycle. Within this cycle improvement is accomplished in a series of steps or specific improvement actions such as introducing new or changed practices into software processes or removing old ones. An important step in the improvement cycle, however, is the execution of some form of data gathering to establish the initial state, and subsequently to confirm the improvements.

This part of ISO/IEC TR 15504 provides guidance on using software process assessment as the primary means of understanding the current state of an organization's software processes, and on using the results of the assessment to formulate and prioritize improvement plans. This guidance is embodied within a general framework for the use of process metrics in software process improvement.

The improvement framework is built on the framework for quality improvement embodied in ISO 9004-4.

This part of ISO/IEC TR 15504 is primarily aimed at the management of an organization considering or undertaking a software process improvement programme, possibly as a result of a process capability determination; members of improvement teams, particularly leaders and facilitators; software engineers; and external consultants helping organizations to undertake software process improvement.

This process improvement guide addresses the following topics:

- an overview of process improvement — the factors which drive software process improvement and general principles which underpin it;
- a methodology for process improvement — an eight step model for improving software processes within a continuous improvement cycle;
- cultural issues — aspects of organizational culture that are critical for successful process improvement;

— management — software process improvement from a management perspective including an overall framework for process measurement.

Annexes provide supplementary information including examples of the use of the process measurement framework; an illustrative case study of application of this part of ISO/IEC TR 15504; and mappings between the steps in the model described in this part of ISO/IEC TR 15504 and ISO 9004-4.

1 Scope

This part of ISO/IEC TR 15504 provides guidance on using software process assessment as part of a framework and method for performing software process improvement in a continuous manner. The guidance covers:

- a) invoking a software process assessment;
- b) using the results of a software process assessment;
- c) measuring software process effectiveness and improvement effectiveness;
- d) identifying improvement actions aligned to business goals;
- e) using a process model compatible with the reference model defined in ISO/IEC TR 15504-2 as a framework for improvement;
- f) issues related to organisational culture in the context of software process improvement;
- g) dealing with management issues for software process improvement.

The guidance provided does not presume specific organizational structures, management philosophies, software life cycle models or software development methods. The concepts and principles are appropriate for the full range of different business needs, application domains and sizes of organization, so that they may be used by all types of software organizations to guide their improvement activities.

An organization may select all or any subset of the software processes from the reference model, for assessment and improvement in the light of its particular circumstances and needs. The guidance provided can also be used with other process models.

The guidance provides a framework for implementing improvements in a continuous manner. However, there is no reason why the organization could not employ the guidance for a single cycle of improvement activity.

2 Normative reference

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC TR 15504. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO/IEC TR 15504 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/IEC TR 15504-9:1998, *Information technology — Software process assessment — Part 9: Vocabulary*.

3 Terms and definitions

For the purposes of this part of ISO/IEC TR 15504, the terms and definitions given in ISO/IEC TR 15504-9 apply.

4 Overview of process improvement

4.1 Drivers

The needs and business goals of an organization are often centred around achieving enhanced customer satisfaction, greater competitiveness and improved business value associated with delivery of software or information systems. For organizations with a dependence on software, these key management concerns become drivers that initiate software process improvement throughout the organization with goals of higher software quality, lower development and maintenance costs, shorter time to market, and increased predictability and controllability of software products and processes.

4.2 Process improvement basics

Improvements to the software process may start at any level in the organization. However, senior management leadership is required to launch and sustain a change effort and to provide continuing resources and impetus, although ultimately, everyone in the organization is involved.

In summary:

- software process improvement demands investment, planning, dedicated people, management time and capital investment;
- software process improvement is a team effort;
- effective change requires an understanding of the current process and clear goals for improvement;

- software process improvement is continuous — it involves continual learning and evolution;
- software process changes will not be sustained without conscious effort and periodic reinforcement.

4.3 General principles

The needs and business goals of the organization determine the software process improvement goals that help to identify improvement actions and their priorities. Software process improvement is accomplished in a series of steps or specific improvement actions such as introducing new or changed practices into software processes or removing old ones. A process model may be used to identify practices to be included to improve the capability of each process. Achievement of process improvement goals should be measured quantitatively.

The general principles of software process improvement are:

- software process improvement is based on process assessment results and process effectiveness measures;
- software process assessment produces a current process capability profile which may be compared with a target profile based on the organization's needs and business goals;
- process effectiveness measures help identify and prioritize improvement actions that support organizations in meeting their needs and business goals, and in achieving software process goals;
- software process improvement is a continuous process. Improvement goals identified and agreed within the organization are realized through a process improvement programme that continues through multiple cycles of planning, implementing and monitoring activities;
- improvement actions identified within a process improvement programme are implemented as process improvement projects;
- metrics are used for monitoring the improvement process in order to indicate progress and to make necessary adjustments;
- software process assessment may be repeated in order to confirm that the improvements have been achieved;
- mitigation of risk is a component of process improvement and should be addressed from two viewpoints:
 - the risk inherent in the current situation;
 - the risk of failure in the improvement initiative.

Software process improvement plans and records may be used to support process capability determination, when the proposed process capability needed to meet a contractual requirement exceeds the currently assessed profile (see ISO/IEC TR 15504-8).

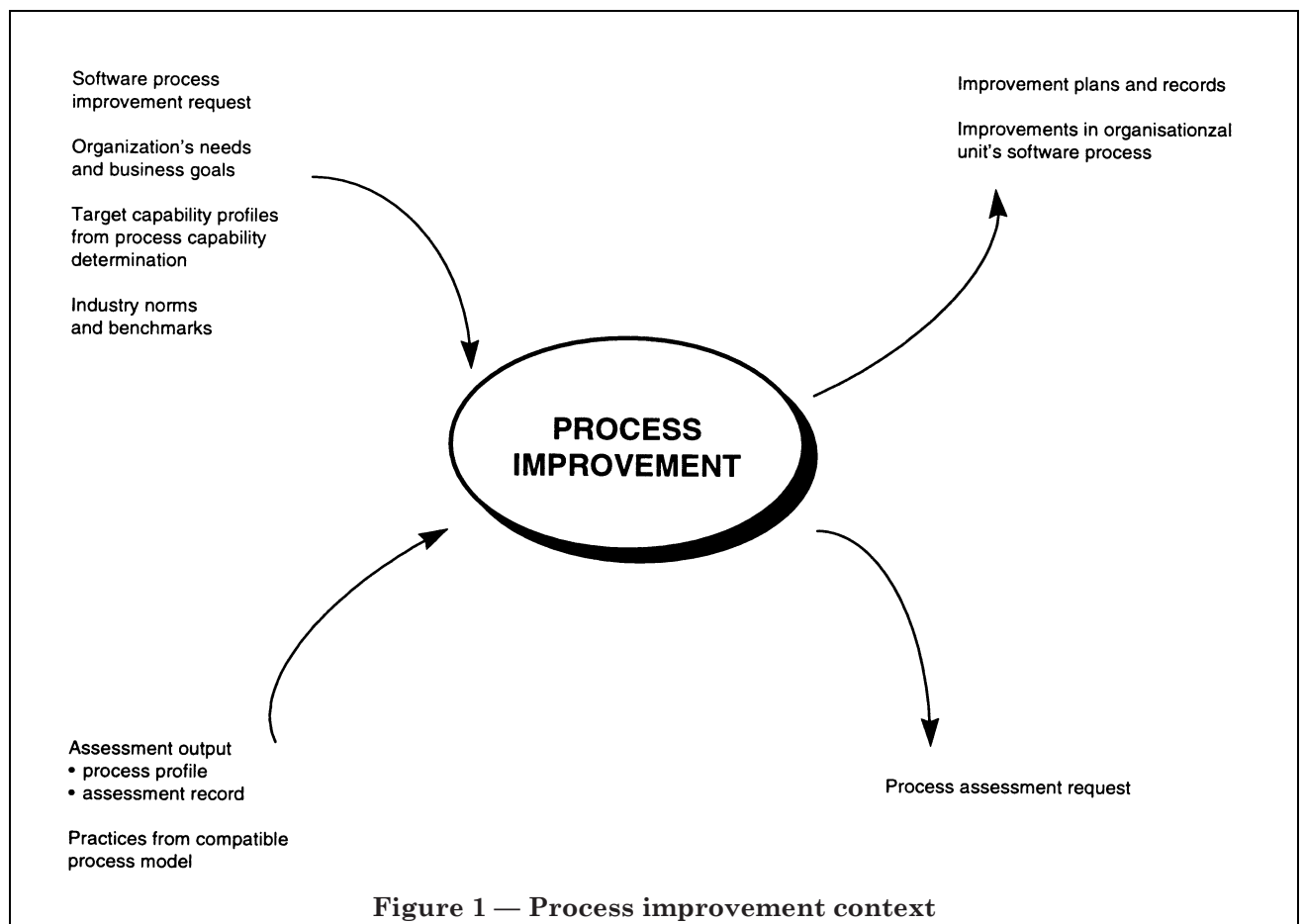
4.4 Process improvement context

The context for software process improvement and its major interfaces are shown in Figure 1. The interfaces are as follows:

- the organization's needs and business goals which are main stimuli for process improvement;
- industry norms and benchmarks providing reference information for improvement planning;
- improvements in the organizational unit's (OU's) software processes as a result.

Process improvement uses other components of ISO/IEC TR 15504 as follows:

- process assessment (as described in ISO/IEC TR 15504-3 and ISO/IEC TR 15504-4) is performed to establish the current capability;
- the assessment results consist of process profiles and all the contextual information held in the assessment record;
- the process model compatible with the reference model in ISO/IEC TR 15504-2 is used as a framework to define processes to be improved, set priorities and identify improvement actions;
- existing improvement initiatives may need to be adjusted to support a new target capability resulting from a process capability determination (see ISO/IEC TR 15504-8);
- improvement plans and records may assist in establishing customer confidence during process capability determination (see ISO/IEC TR 15504-8).



5 Guidelines for software process improvement

When an organization is well motivated and managed for software process improvement (see clauses 6 and 7), it undertakes and implements a number of process improvement activities. Software process improvement benefits accumulate permanently when an organization pursues process improvement activities in a consistent and disciplined series of steps based on data collection and analysis.

Figure 2 illustrates the steps for continuous software process improvement using the components of ISO/IEC TR 15504.

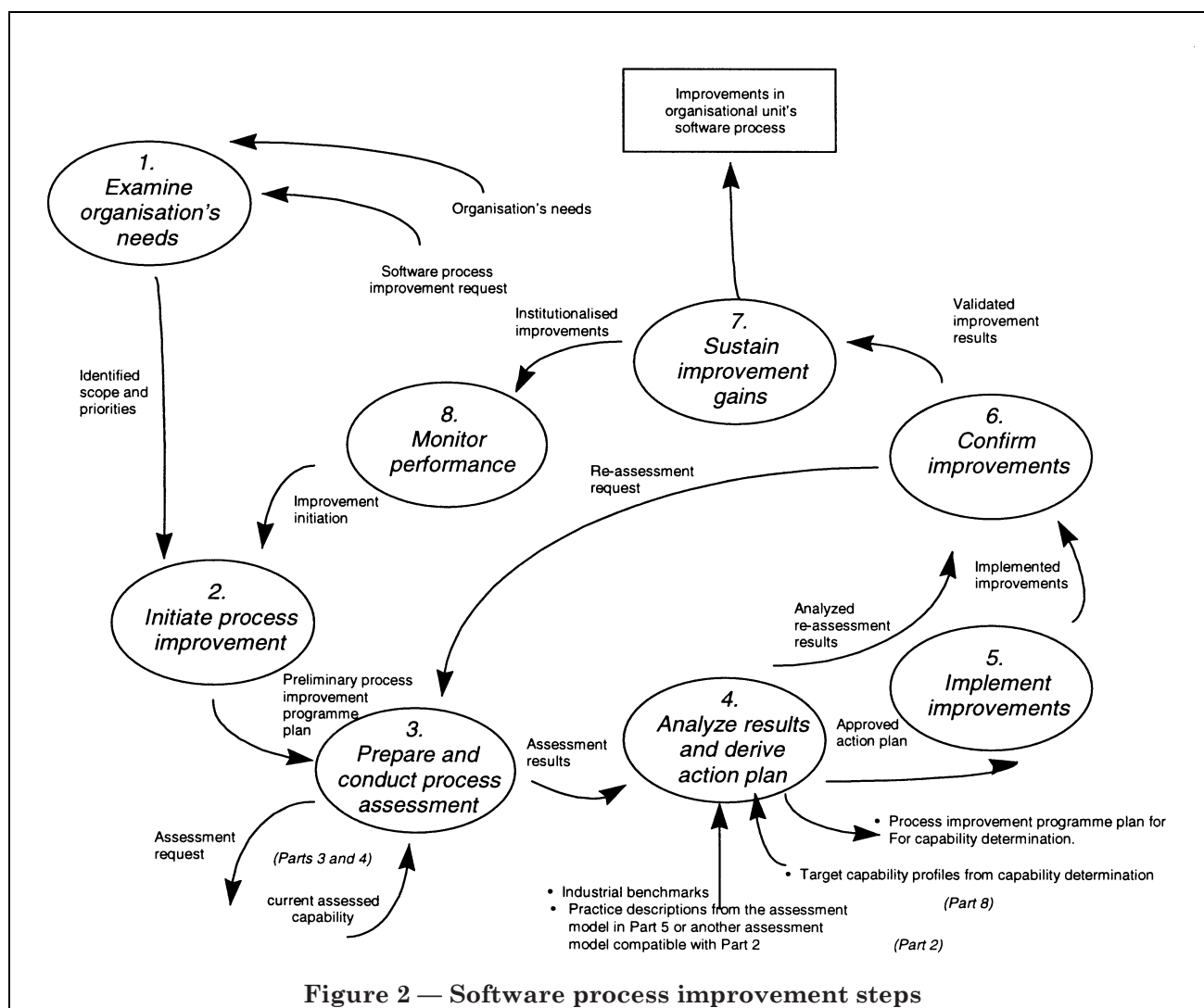


Figure 2 — Software process improvement steps